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OBSERVATIONS ON THE BEHAVIOR OF WILD AND CAPTIVE FALSE KILLER WHALES, WITH NOTES ON ASSOCIATED BEHAVIOR OF OTHER GENERA OF CAPTIVE DELPHINIDS

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OBSERVATIONS ON THE BEHAVIOR OF WILD AND CAPTIVE FALSE KILLER WHALES, WITH NOTES ON ASSOCIATED BEHAVIOR OF OTHER GENERA OF CAPTIVE DELPHINIDS[1]

By David H. Brown[2], David K. Caldwell[3], and Melba C. Caldwell[4]

Abstract: Behavioral data are presented for a captive subadult female false killer whale, *Pseudorca crassidens,* from off southern California. Intergeneric behavior is discussed that occurred between this animal and a captive female Pacific bottlenose dolphin, *Tursiops gilli,* a captive female Pacific common dolphin, *Delphinus bairdi,* several captive male and female eastern Pacific pilot whales, *Globicephala scammoni,* and two captive female Pacific striped dolphins, *Lagenorhynchus obliquidens.* The stillbirth of a dead fetus by the common dolphin and the reactions of the other captive delphinids to it are described. Feeding habits of a captive male *Pseudorca* in Hawaii are noted, as well as comments on its intergeneric relationship with a captive male *Stenella* cf. *roseiventris.* Evidence for observational learning in *Pseudorca, Tursiops truncatus* and *Lagenorhynchus obliquidens* is discussed. Ingestion of foreign objects by the *Pseudorca* is noted. Known behavior by this form in the wild is considered as it seems related to the observed captive behavior. Growth and serologic data for the captive *Pseudorca* are presented, along with growth data for a captive *Globicephala scammoni* male. Apparent records of *Pseudorca* at sea in the eastern and northeastern Gulf of Mexico are included, as well as strandings of this form in Australia. Various kinds of behavior related to that observed for the *Pseudorca* are discussed for *Tursiops truncatus.* Erysipelas infection and its treatment in captive cetaceans is described.

Introduction

A recent summary (Mitchell, 1965) of eight eastern North Pacific records (14 specimens) of the false killer whale, *Pseudorca crassidens* (Owen), suggests that this species is not as uncommon there as was once believed. Mitchell based his summary on earlier literature records, on newly-

[1]Partial support for certain phases of this study was received by the Caldwells through grants from the National Institute of Mental Health (MH-07509-01) and the National Science Foundation (GB-1189).

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obtained skulls from western North American beaches and on sight records of animals at sea attributed to this species. Included in that summary was the captive animal which forms the primary basis for the present report. Despite this increasing evidence for the frequent occurrence of this species, few data have been provided concerning its behavior in the wild and nothing has been published heretofore on the details of captive behavior.

Since early 1954, Marineland of the Pacific collectors, Captain Frank Brocato and his assistant Frank Calandrino, have had the opportunity of observing from the collecting vessel *Geronimo* the movements and behavior of delphinids in the coastal waters of southern California. They first reported sighting *Pseudorca* on December 1, 1959 (also see Norris and Prescott, 1961: 335). On this occasion approximately 300 animals were seen three miles northwest of the west end of Santa Catalina Island, California.

More recently, on October 10, 1963, Brocato and Calandrino, encountered a second school of false killer whales some four miles southwest of Long Point lighthouse, Palos Verdes Peninsula, near Los Angeles, California. On this day *Geronimo* was following a southwesterly course; the sea was moderately rough and a wind of 12 to 15 knots was blowing in a southwesterly direction. Calandrino, who was at the wheel, noticed a school of animals approaching from the south. These rapidly gained on *Geronimo* and were identified as false killer whales. Approximately 300 animals were in a diffuse school which consisted of numerous small groups of two to six individuals. The school was spread over an area approximately ½ mile wide and two miles long. Brocato and Calandrino estimated the whales' swimming speed to be at least 10 knots. As the animals passed *Geronimo* they were observed to slap their tail flukes forcefully on the water's surface. Many were vocalizing at this time; the sounds emitted by animals from between 150 to 200 yards away were clearly heard. Both Brocato and Calandrino described these sounds as piercing, harsh and quite consistent (see Schevill and Watkins, 1962: 13). The size of the animals varied from the calves of approximately five feet to adult animals, some of which were estimated to be 18 feet long.

Shortly after passing *Geronimo*, several of these groups encountered a school of bonito, *Sarda lineolata* (Girard), and commenced to feed upon these fish. This attracted other groups that also stopped to feed. The collectors were most impressed by the power and speed of these delphinids whose rushes at the fish not infrequently caused them to lunge their bodies, as far as the pectoral flippers, out of the water. On several occasions individuals were observed grasping the large powerful bonito in their jaws. The *Geronimo* was able to approach a feeding group of five or six animals and collector Calandrino was thus presented with the opportunity of snaring one of these. The fellow members of this group stood by the ensnared animal; however, the other whales continued to behave and feed in a normal manner. Many vocalizations were heard at this time that were described as piercing whistles which seemed to be of a higher frequency than those heard to emanate from other delphinids.

The first capture was attempted on an animal approximately 13 feet long, but this individual threw off the snare. Some 30 minutes after the unsuccessful attempt, a second animal was taken. The other whales in the group were seen to rub their bodies on the line securing the ensnared animal. When alongside *Geronimo's* hull they abandoned the captive, which showed little tendency to fight against the line. When lifted aboard, the false killer whale was found to be a female that measured exactly 11 feet, 3 inches, from the tip of the snout to the median notch of the tail fluke. When lying on the stretcher on *Geronimo* she snapped her jaws on several occasions when the collectors ventured too close.

The false killer whale was released upon its arrival at Marineland into a holding tank occupied by three female eastern Pacific pilot whales, *Globicephala scammoni* Cope. The animal began immediately to swim around the periphery of the tank at great speed, whistling constantly. The individual phonations lasted approximately two seconds. The animal's calls were loud and audible at a considerable distance from the tank. The following morning the whale had slowed down, but continued, however, to swim in a circular motion around the enclosure and appeared to shun completely the company of the *Globicephala* which at this time maintained a stationary position at the surface in the center of the tank.

Later in the morning, while throwing squid to these animals, the attendant was amazed to see the *Pseudorca* commence to feed. It did this quite voraciously and accepted a considerable quantity of food throughout the day. The following morning the false killer whale swam to the feeding platform and accepted mackerel directly from the attendant's hand.

On October 14, after draining the tank to a depth of three feet, the whale was examined and a blood sample taken (see Appendix I). The animal accepted food at this time and did not appear alarmed by the procedures.

In the ensuing weeks the false killer whale became very tame and quickly learned to leap free of the water to receive portions of her food (Fig. 1).

No aggressive behavior was directed towards the pilot whales. The smaller of this trio would, however, attack and hotly pursue the *Pseudorca* around the tank.

This lack of aggression by the false killer whale was also observed by Mr. Chris Varez (*pers. conversation,* 1965) for a male that he once handled at Sea Life Park in Hawaii. Varez noted that this animal was very mild in its relationships with other delphinids captive with it. Like the Marineland animal, it also readily learned to take food, although it would become startled at first if Varez touched it during this learning process. However, Varez was impressed with the fact that even though the *Pseudorca* would become startled and swim away on such an occasion, it would appear to reach out with its tail flukes as it swam by.

The false killer whale was moved to the circular oceanarium tank on November 4. The animal appeared at ease during these proceedings and lay

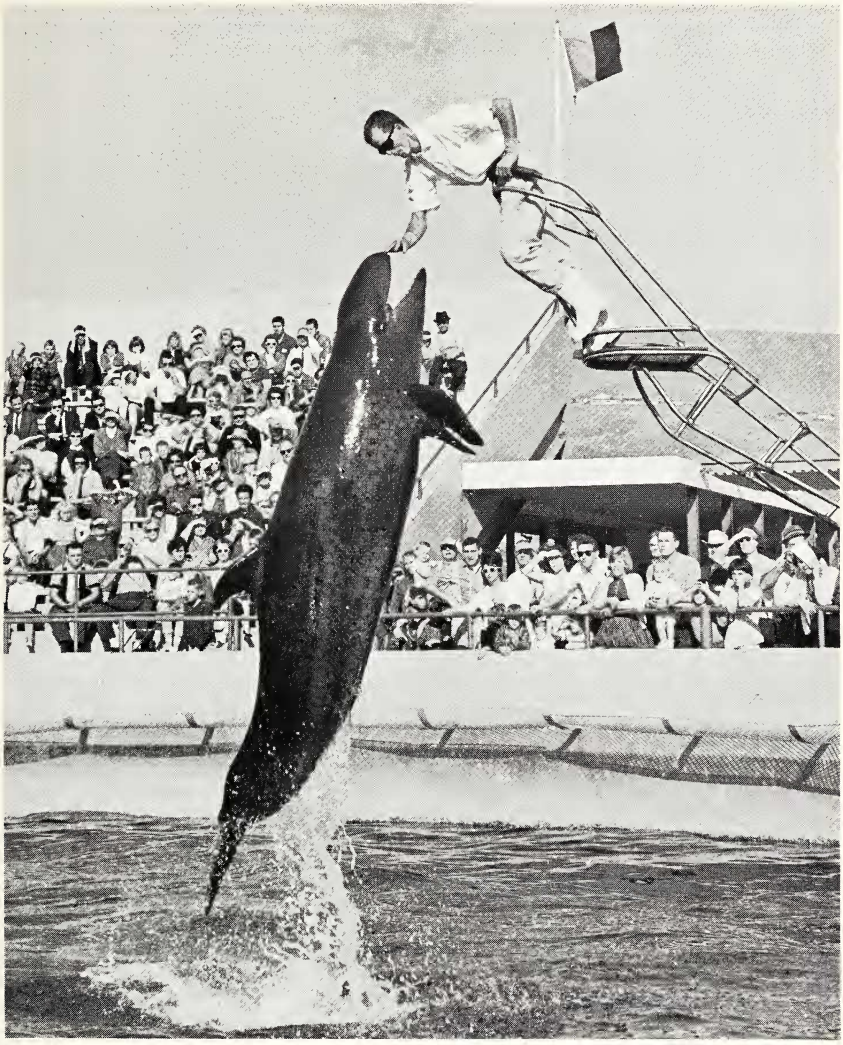

Figure 1. Captive female false killer whale jumping completely clear of the water on cue. The general outlines of the body are clearly shown. Photograph by Cliff Brown, Marineland of the Pacific.

quietly in a stretcher while the transfer was in progress. Upon release, she quickly swam to a platform and accepted food.

Marineland's circular tank is 80 feet in diameter and 19 feet deep. Glass windows placed in three levels of corridors permit observation of the animals exhibited within its depths. From this underwater observation point, we

observed that our sub-adult female possessed double twin mammary slits (*i.e.*, one pair of slits on each side of the vaginal opening). However, Comrie and Adam (1938: 52lf.) have indicated that, in a fetal specimen they examined, one slit of each pair seemed to house a functional nipple and the other of each pair they termed an *accessory groove*.

SOCIAL BEHAVIOR OF *Pseudorca* WITH OTHER CAPTIVE DELPHINIDS

Prior to November, 1963, the Marineland exhibit consisted of one male and one female pilot whale and two female Pacific striped dolphins, *Lagenorhynchus obliquidens* Gill. The active false killer whale (Fig. 2) tended to ignore the lethargic pilot whales and sought the company of the active dolphins. The three animals thereafter were seen rubbing their bodies together and the larger animal frequently "mouthed" the bodies of her small companions. The whale often pursued the dolphins around the tank. This playful activity usually ended in the three swimming closely together, the smaller dolphins coasting alongside the false killer whale.

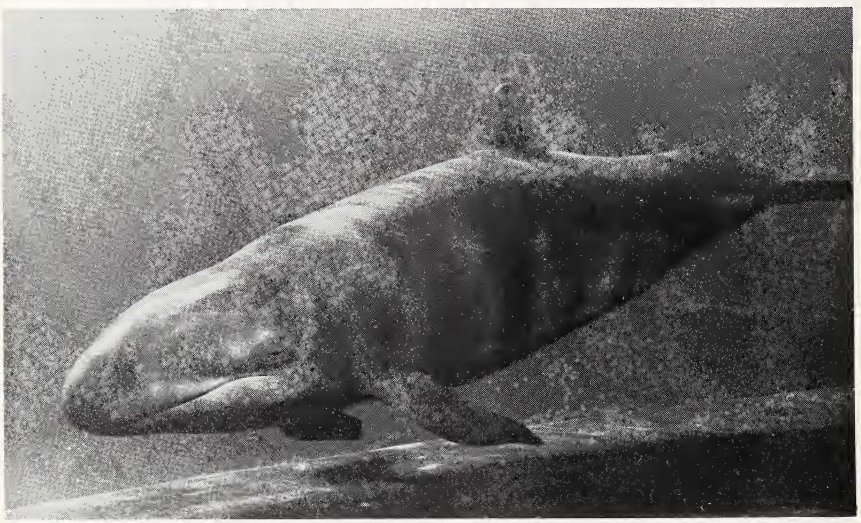

Figure 2. Captive female false killer whale underwater. Photograph by Cliff Brown, Marineland of the Pacific.

A female Pacific bottlenose dolphin, *Tursiops gilli* Dall[5], placed into the tank on December 10, 1963, became a close companion of the false killer whale. Immediately following her introduction, the dolphin was closely examined by the larger animal and subjected to the gentle "mouthing" described above.

[5]Daugherty (1965: 43) followed some recent authors in using the combination *T. truncatus gilli* for this form. However, we follow more common published usage in giving the form named *gilli* full specific recognition.

Chris Varez (*pers. conversation,* 1965) stated that the male Hawaiian *Pseudorca* that he worked with at Sea Life Park soon became close companions with a small male spinner dolphin, *Stenella* cf. *roseiventris* (Wagner)[6], and often carried it on his snout even though the almost-white (at capture; it later darkened in color) *Stenella* was in apparent perfect health.

BEHAVIOR OF *Pseudorca* DURING BIRTH OF A COMMON DOLPHIN

On December 13, 1963, a female Pacific common dolphin, *Delphinus bairdi* Dall[7], arrived at Marineland. Shortly before being placed into a quarantine tank, the dolphin showed the symptoms of shock. Following the intramuscular injection of a tranquilizer drug, the animal became soporific and could not remain at the surface without assistance. Help was rendered by one of Marineland's divers who entered the tank and supported the little dolphin in his arms. Upon release, the effects of the drug remained evident and the animal drifted at the surface and made little attempt to swim. Silver smelt thrown into the tank elicited immediate response and the tranquilized newcomer consumed a quantity of this fish. The dolphin continued to feed and on January 9 she was transferred to the Circular Tank.

The common dolphin is difficult to maintain in a captive environment. This species appears to be peculiarly emotional and particularly sensitive to the competitive feeding behavior normally demonstrated by larger, more aggressive, forms (Brown and Norris, 1956: 318). This specimen, however, appeared to adapt rapidly to an enclosure shared with delphinids of four other genera.

Dolphins in the latter stages of pregnancy normally display a pronounced distention of the inguino-abdominal region. The small common dolphin failed to show these signs. It was, therefore, a surprise when, at approximately 11:50 AM on February 15, observers saw a small tail protruding from her birth canal. The birth progressed very rapidly and by 12:05 PM the entire posterior portion of the fetus had been expelled. The umbilical cord, which seemed stretched and taut, was clearly visible.

The striped dolphins and false killer whale followed the laboring female (Fig. 3). The dolphins showed particular interest and nosed the female's abdominal region on several occasions (Fig. 4).

[6]In the use of this name for the Hawaiian animal, we follow the suggestion of F. C. Fraser (*pers. comms.* from R. J. Harrison to Brown, 1965, and from Fraser to D. K. Caldwell, 1965) following his examination of material of this species furnished him by Brown.

[7]F. C. Fraser, British Museum (Natural History), regards the Pacific common dolphin under study here as probably conspecific with the Atlantic form, *D. delphis* Linnaeus, (*pers. comm.,* 1964, to Brown after making a comparison of skulls from the Atlantic and northeastern Pacific). Daugherty (1965: 26) used the trinomial combination *D. delphis bairdi.* For the present, however, we follow usual published usage in our application of full and separate specific rank to the form of *Delphinus* here discussed.

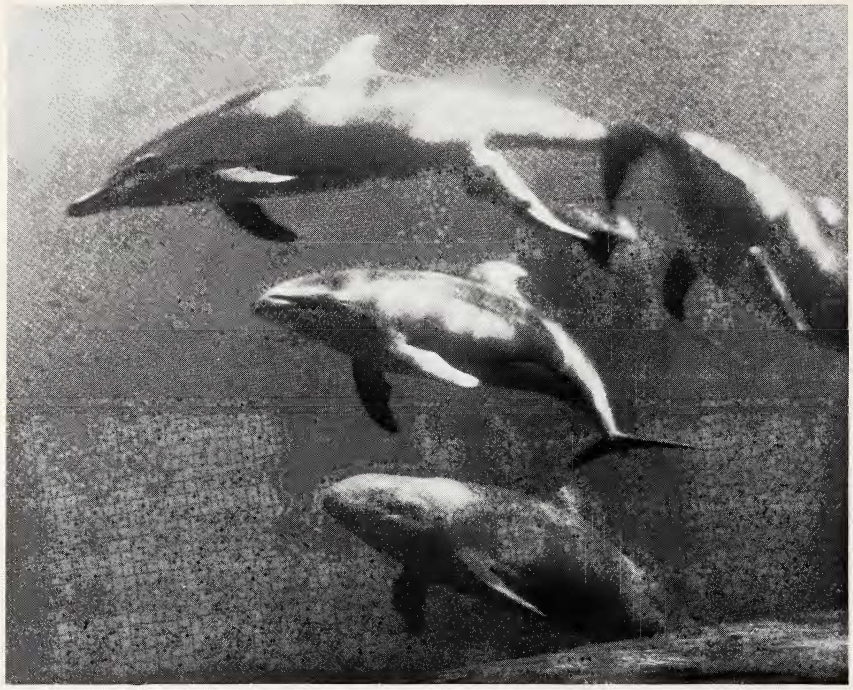

Figure 3. Captive female Pacific common dolphin in labor (fetus partially extruded) followed immediately below and to the right by two female Pacific striped dolphins and below them by the female false killer whale. The tail of the fetus obscures the head of an eastern Pacific pilot whale circling in the background. Photograph by Cliff Brown, Marineland of the Pacific.

The dorsal fin of the calf appeared to obstruct its further passage. In normal births the dorsal fin folds at its base either to the right or left, but in this case it remained erect and caught internally at the apex of the vaginal introitus (Fig. 5).

At 12:15 PM one of the striped dolphins grasped the fetal tail flukes in its mouth and withdrew the infant from the parental birth canal. A discharge of amniotic fluid and a little blood followed the delivery (Fig. 6).

The infant was stillborn, and delayed expulsion at a critical phase of parturition was no doubt incriminated in this fetal death.

McBride and Kritzler (1951: 253) attributed difficulties in the birth of an Atlantic spotted dolphin, *Stenella plagiodon* (Cope), to the left pectoral flipper impeding passage of the calf. It is interesting to note, however, that the maternal exertions witnessed by these authors were not observed in the present case in question.

Our common dolphin, attended by the striped dolphins, carried her dead infant's body to the surface. These efforts were, however, terminated by the male pilot whale, who seized the body by its head (Fig. 7). The pilot whale

Figure 4. Captive female Pacific common dolphin in labor with fetus partially expelled. She is followed to the left by the female false killer whale and to the lower right by two female Pacific striped dolphins. Photograph by Cliff Brown, Marineland of the Pacific.

devoured the small cadaver, entire, after carrying it to and from the surface for 38 minutes (see Appendix II).

The common dolphin at first seemed little affected by the intervention of the pilot whale, but appeared greatly distressed by his ingestion of the cadaver. Whistling constantly, she moved rapidly around the tank, swimming in an erratic manner, apparently searching for her calf.

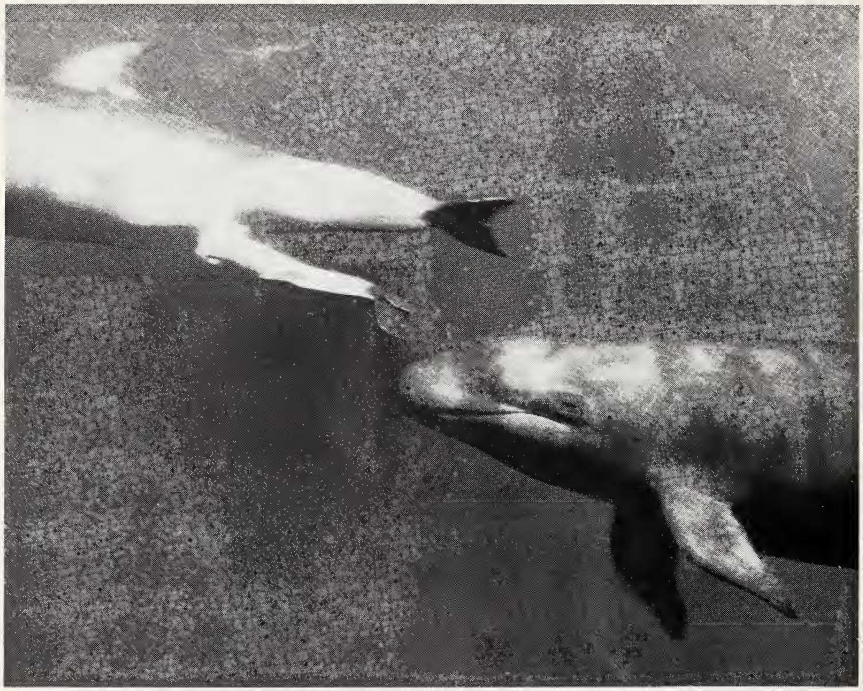

Figure 5. Captive female false killer whale following female Pacific common dolphin with protruding fetus. The dorsal fin of the fetus is erect (only the base can be seen) and hooked internally at the apex of the vaginal opening. A reflection on the viewing window has been retouched so that it is not so obvious as it appears just before the snout of the false killer whale. Photograph by Cliff Brown, Marineland of the Pacific.

The animal quickly resumed a more normal swimming pattern, in the company of the striped dolphins, but she continued to vocalize intermittently for several hours.

Since 1:00 PM, continuous uterine contractions had caused a three-inch length of the umbilical cord to move in and out of the female's urogenital opening. At 4:06 PM, the common dolphin sought the company of the female false killer whale. She was observed at this time to deliberately avoid the company of the striped dolphins and begin to swim on the west side of the tank quite close to the surface. The false killer whale swam to the little dolphin and, after an apparent deliberate examination of her genital area, gently grasped the umbilical remnant in her mouth, and with a lateral movement of her head withdrew this tissue some six inches from the common dolphin's body. The dolphin rolled on her back and broke away from the larger animal, but then returned and again waited for the false killer whale. Once more, the whale seized the placenta and repeated the behavior previously

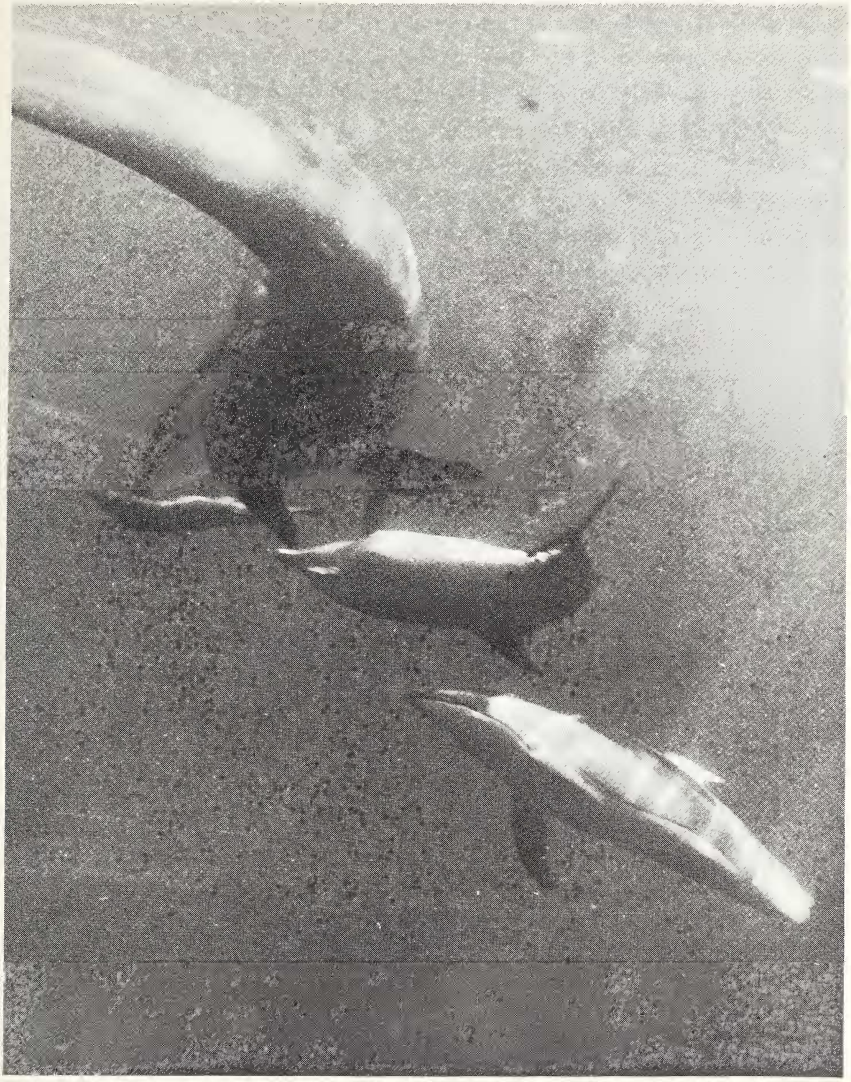

Figure 6. Following the delivery of her dead fetus (seen just below and to the left of the large female false killer whale), a cloud of amniotic fluid and a little blood is discharged by the now-upside-down female Pacific common dolphin (center). An interested female Pacific striped dolphin is seen at the lower right, while in front of the false killer whale another female Pacific striped dolphin nuzzles the dead fetus. Photograph by Cliff Brown, Marineland of the Pacific.

Figure 7. Captive male eastern Pacific pilot whale carrying newly-stillborn Pacific common dolphin fetus just prior to swallowing it. Photograph by Cliff Brown, Marineland of the Pacific.

described and withdrew the membrane another three inches. The common dolphin during these periods was observed to actively flex her body and appeared to try to assist the false killer whale in its attempts to remove the afterbirth. At the third attempt, the female false killer whale was successful and withdrew the entire placental membrane from the smaller animal. This was released and immediately both animals resumed normal activity in the tank. The free placental membrane was closely examined by the striped dolphins, but was swept away and down the drain before it could be recovered by the Marineland staff or before the dolphins could further investigate it.

SEXUAL BEHAVIOR

Intergeneric sexual behavior has been observed between the female *Pseudorca* and the large male *Globicephala* (the same animal discussed in Appendix II) held captive with her.

On April 27, 1965, at 1:00 PM just after the male pilot whale had been fed, the false killer whale was observed lying on her side at the surface. The male slowly approached and rubbed his bulbous cephalic melon against her

tail flukes for some 5 to 8 minutes (Fig. 8). On another occasion, it had been noted that this same male pilot whale and a smaller female of the same species violently bumped melons, head on, in their precopulatory sexual behavior (Brown, 1962: 60).

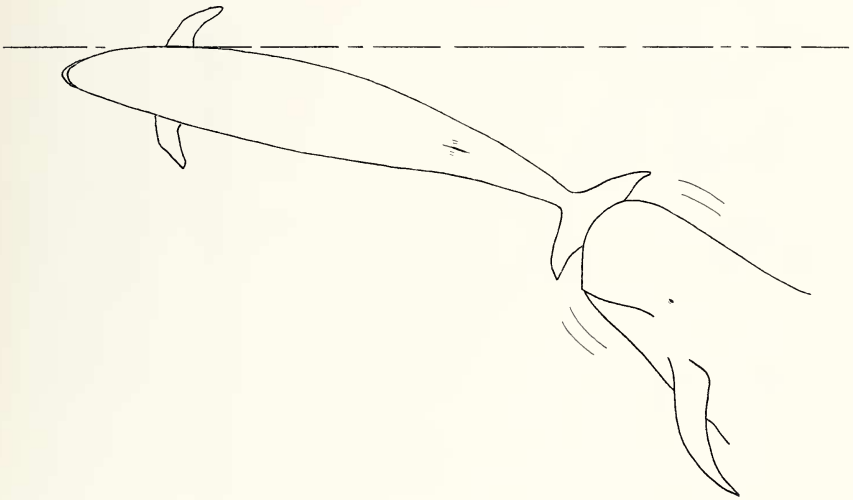

Figure 8. Diagrammatic representation of position of captive male eastern Pacific pilot whale while rubbing his cephalic melon on the tail flukes of female false killer whale during initiation of precopulatory sexual behavior. Sketch by Donald Hackett, Marineland of the Pacific.

After rubbing his melon against the tail flukes of the *Pseudorca,* the pilot whale had an erection. The *Pseudorca* then remained on her side at the surface while the pilot whale swam alongside her, belly to belly and head to force her way between the *Pseudorca* and the male pilot whale, rubbing both of the large animals in the process. She was not successful in this attempt to separate the mating pair.

At 7:30 AM on the third day, April 29, the same preliminary behavior was again observed. However, on this occasion intromission occurred (Fig. 9). During this behavior on the third day, a small female pilot whale attempted tank wall. Similar behavior, also ending in the failure of intromission, was observed on the following morning at 9:00 AM.
to head. Although attempted, intromission failed–possibly because the pair was disturbed when the currents in the tank caused the animals to drift into the

Tavolga and Essapian (1957: 14) noted that, in pairs of captive *Tursiops*

truncatus (Montagu)[8] in Florida, the male took the more active role in initiating precopulatory behavior. This was also the case in the sexual interaction between the *Pseudorca* and the *Globicephala*. Here the male appeared to make the initial advances and no attempts by the female *Pseudorca* to

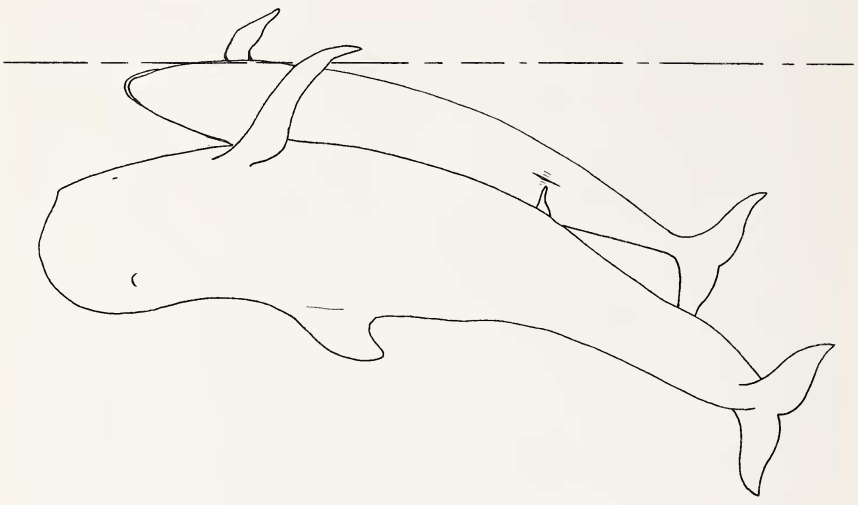

Figure 9. Diagrammatic representation of positions of captive female false killer whale, on her side at top, and upside-down male eastern Pacific pilot whale, during intromission. Sketch by Donald Hackett, Marineland of the Pacific.

solicit his attentions were observed. These findings, and those of Tavolga and Essapian, are contrary to those observed previously for *Globicephala-Globicephala* and *Lagenorhynchus-Tursiops* sexual pairs at Marineland of the Pacific. Instead, the females generally seemed to be responsible for the initiation of precopulatory behavior (Brown, 1962: 61). We have also recently observed this same female sexual aggression in mating pairs of *T. truncatus* at Marineland.

HOMOSEXUAL BEHAVIOR

The female *Pseudorca* also was involved in homosexual behavior. Shortly after she was introduced into the Circular Tank with the *Pseudorca,* the female *Tursiops gilli* and the false killer whale established the close relationship

[8]Also see footnote 5. If one follows some recent authors in giving the form named *gilli* only subspecific rank, then this Atlantic form would be called *T. truncatus truncatus.*

noted above. Soon after this relationship was established, homosexual behavior was observed between the two.

In this behavior one female rubbed the urogenital aperture of the other with her snout (jaws closed) and often even inserted the tip of the snout (jaws closed) or lower jaw (mouth open) into the vulva of the passive participant. This position was frequently maintained even as the two animals swam around in the tank at considerable speed. Immediately after such an interaction, the two participants exchanged positions and roles and the behavior was repeated. Such behavior was observed on many occasions.

This same behavior was also exhibited by the *Pseudorca* with one of the small female *Globicephala,* with each taking both roles.

Again, the same behavior has been observed between the same captive female *Delphinus* and the same captive *Tursiops gilli* noted above. We have also observed it as it took place recently at Marineland between two captive female *T. truncatus* and two captive female *Lagenorhynchus obliquidens,* and Brown (1962: 62) reported similar behavior between a captive female *L. obliquidens* and a female *Globicephala scammoni.*

Within minutes, the same two female *T. truncatus* that we observed engaged in homosexual behavior were also engaged, before and after, in sexual behavior with a male of the same species.

PROTECTIVE BEHAVIOR

On January 6, 1965, it became necessary to drain the Circular Tank for the purpose of giving the occupants their bi-annual erysipelas vaccination (see Appendix III). The water level had reached the desired depth of three feet by 7:45 PM. It was then dark, and it was necessary to illuminate the work area with flood lights placed around the top of the tank.

After administering a prophylactic injection to a pilot whale, two of the men helping in the tank, trainer Ray Cribbs and diver Richard Blacker, effected the capture of the common dolphin. The small dolphin immediately commenced to emit a series of high-pitched whistles. The false killer whale, apparently attracted by these vocalizations, inserted her head between the man holding the hinder end of the *Delphinus* and the animal's body. It then gently, but nevertheless very deliberately, proceeded to push its companion out of its captor's arms. Both Cribbs and Blacker later stated it was impossible to hold the *Delphinus* at the time. The false killer whale made no attempt to bite, and in fact failed to direct any aggressive behavior at either of the men involved. Upon effecting the dolphin's release, both it and the *Pseudorca* swam together for a short time. Shortly thereafter, the common dolphin was captured once more, and the injection made quickly before the false killer whale could again intervene.

On March 20, 1965, the female *Delphinus* refused to accept food. Emesis also occurred on several occasions during this and the following day. It was decided to remove her from the exhibit, and in the evening the Circular Tank was again drained to a depth of approximately three feet.

Upon the common dolphin's being secured by trainer Joe Beazie, the *Pseudorca* again approached and intervened. The dolphin was whistling at this time. The whale quickly effected the dolphin's release by pushing her out of the man's arms. The next attempt was made by both trainers Cribbs and Beazie and they were again obliged to release the animal owing to the intervention of the false killer whale. At this time the false killer whale grasped and gently pressed one of Cribb's legs in her mouth. A third attempt made by Beazie elicited the same behavior; *i.e.*, the whale seized his leg and relinquished its hold only upon the dolphin's release. Immediately after this, the false killer whale carried the *Delphinus* on its back for several seconds. It was then decided to drain more water out of the tank until a depth of 18 inches at the sides was reached. Again the animal was captured and this time removed. During this last attempt, the false killer whale swam to the shallow edge of the tank and stranded herself in her effort to come to the aid of the common dolphin.

On the day following the removal of the *Delphinus* (see Appendix IV), the *Pseudorca* continued to behave and feed in a normal manner.

Observational Learning

The successful maintenance of the *Pseudorca* provided many opportunities to observe her behavior under prolonged captive conditions. As noted above, this animal rapidly adapted to the captive environment and consistently proved more precocious than other delphinids exhibited at Marineland. She also adapted to new situations and new objects in her tank more rapidly than we have observed other delphinids to do (*e.g., Tursiops truncatus, T. gilli, Lagenorhynchus obliquidens, Globicephala scammoni, Stenella plagiodon, S.* cf. *roseiventris* and *Delphinus bairdi*). In conjunction with this behavior, it was found that the false killer whale appeared to be extremely adept at learning by observation (also see Appendix V). Before her introduction into the displays, the learning by one animal of unnatural conditioned behavior by observation of another animal had not been encountered in Marineland's cetacean colonies.

However, the *Pseudorca,* after being introduced into the Circular Tank, in this manner learned several of the trained pilot whales' tricks. Some of this learned behavior was later reinforced, but initially it was not even encouraged. All of the tricks were learned by the *Pseudorca* during the first year of her captivity and included: (1) "Shaking hands," *i.e.*, lying on the side at the surface of the water and presenting a flipper, out of water, to be "shaken" by the trainer; (2) "Dance," *i.e.*, extending the upper part of the body out of the water in a perpendicular position and revolving in place; (3) "Sing," *i.e.*, vocalize through the blowhole with that opening out of water; (4) Leap to grasp a large paddle in the mouth and fall back into the water in order to trigger a camera that photographs a human patron.

INGESTION OF FOREIGN OBJECTS

The pathologic consequences of foreign-body ingestion are a constant threat to survival of captive delphinids (Brown, 1960: 345; Brown, *et al.*, 1960; Caldwell, Caldwell and Siebenaler, 1965: 6). Dr. Masayuki Nakajima, Curator of the Enoshima Marineland, Futisawa, Japan, recently wrote Brown (*pers. comm.*, October 7, 1965) that the ingestion of pieces of rope, cloth, stones and balls have been incriminated in the deaths of 14 dolphins of unstated species held at that establishment. At Marineland of the Pacific the swallowing of foreign objects has resulted in the loss of 8 trained animals, and is the greatest single cause of cetacean mortality yet encountered at the oceanarium.

The false killer whale seems peculiarly prone to playing with objects of this kind. Fortunately, however, when observed indulging this habit she will usually swim to the feeding platform when summoned and permit removal of the object from her mouth (Fig. 10). Combs, pens, plastic toys, coins, and a variety of items have been recovered in this manner.

In the evening of June 1, 1965, two metal bottle caps were dropped into the tank where both were seized almost immediately by the false killer whale.

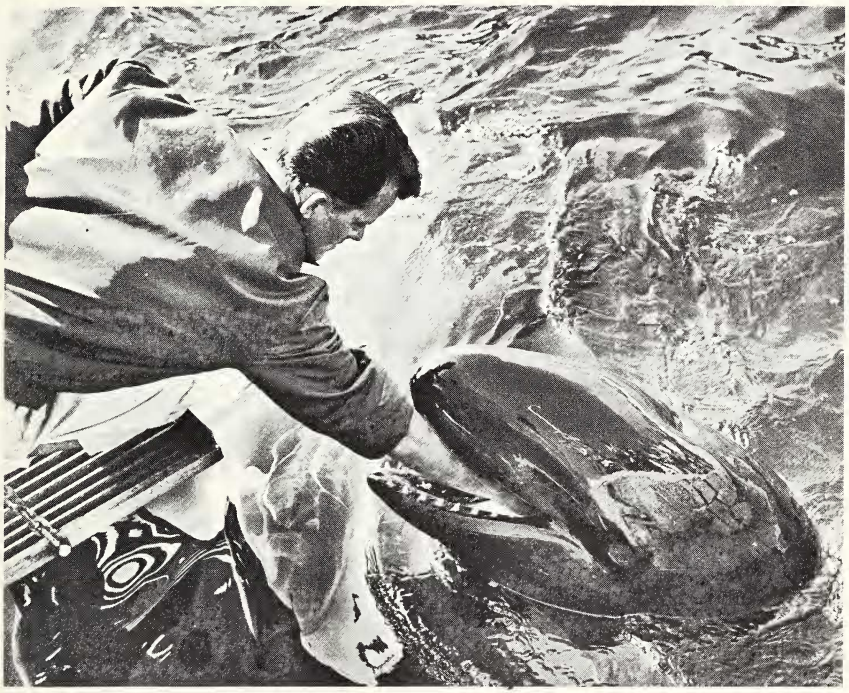

Figure 10. Captive female false killer whale voluntarily allowing an attendant to reach into her mouth to retrieve a foreign object which she has picked up in the tank. Photograph by Cliff Brown, Marineland of the Pacific.

Chief diver Jake Jacobs witnessed this event and, despite his endeavors to effect their recovery, both caps were swallowed by the whale. The administration of two quarts of mineral oil the following day induced emesis. A number of items were regurgitated. However, these settled to the floor of the tank and migrated into the drain before identification could be made. A plastic toy and cigar holder floated, however, and these were netted and removed from the water before they could be swallowed again by the whale. The use of mineral oil as an emetic in delphinids was described by Brown (1960: 345) after the egestion of a rubber inner tube by a captive *Globicephala scammoni*. Since then mineral oil has been used successfully at Marineland of the Pacific in several similar cases, and its use apparently saved the life of a captive *Tursiops truncatus* that had swallowed a large amount of plastic material (Caldwell, Caldwell and Siebenaler, 1965). In September, 1965, a trained *Tursiops* sp. owned by Mr. Jack Evans of Tweedheads Aquarium in Australia, swallowed a metal whistle used in training the animal. Two quarts of mineral oil were given by intubation. Regurgitation occurred and the whistle was recovered 24 hours after this treatment.

On July 8, the Marineland false killer whale showed little interest in its food and avoided contact with the other animals. Its behavior did not change during the following two days.

On July 11, the whale became inappetent and drifted at the surface in a listless manner. The tank was drained to a three-foot level at 8:45 PM. The animal proved unusually difficult to restrain and, although several attempts were made, efforts to take a blood sample failed. The whale was, therefore, released after the intra-muscular administration of a wide-spectrum antibiotic and vitamin B_1.

The next day the whale was appetent once more. Emesis was again induced but additional foreign bodies were not seen.

In the following two weeks the false killer whale gradually returned to its usual feeding and behavior pattern, and at this writing appears normal in every way.

The accidental dropping of inedible material is a perpetual menace to the health of this interesting animal, and its continued survival is largely due to the vigilance and concern of the Marineland training and diving staff.

GROWTH

On November 4, 1963, when she was first moved to the Circular Tank, the *Pseudorca* weighed 825 pounds and her snout to caudal-notch length was reconfirmed at 11 feet, 3 inches.

On August 31, 1965, when the water in the Circular Tank was lowered for other routine purposes, the false killer whale was again measured and weighed for the first time since that date in 1963. It was found that she had increased in length to 12 feet, 5 inches, and in weight to 1100 pounds.

An accurate record of her food consumption had been kept during this

22-month interval, and it was found that a total of 30,650 pounds of fish and squid had been required to make these increases in this very active animal.

Although he was too large to weigh with the facilities available, by comparison the large male pilot whale, involved in various incidents of behavior noted herein, was 17 feet, 3 inches in snout to caudal-notch length when first measured on January 21, 1959, and had increased to a length of 19 feet, 2 inches on August 31, 1965. Brown (1962: 63) earlier noted that a female pilot whale had increased 23 inches in length over a period of three years and two months in captivity at Marineland.

WILD BEHAVIOR RELATED TO THE CAPTIVE OBSERVATIONS

Published reports on observations of large herds at sea and on mass strandings provide abundant evidence that *Pseudorca* is a very social form (*e.g.*: Harmer, 1931; Fraser, 1936, 1937: 296-298, 1946: 40; Peacock, 1936; Kellogg, 1940: 84, 89; Mitchell, 1965; Appendix VI herein). It is probably due, at least in large part, to this social behavior among its fellows in the wild that the captive animal discussed above has proven so adaptable in its relationships with its tank mates, consisting at times of representatives of as many as four other delphinid genera.

Furthermore, the false killer whale appears to exhibit a remarkable lack of fear toward new and strange situations and hence seems to be more quickly and readily trainable in captivity than many other cetaceans (most notably *Tursiops truncatus*) which have been studied. The rapid acclimation of our captive to taking food from the hand of a trainer has already been discussed above. That this reduced fear behavior also regularly extends to the wild is suggested by the following field observations on cetaceans made in Florida, and which seem, with little doubt, to be attributable to the false killer whale.

In the hope of obtaining field observations on cetaceans, during the summers of 1964 and 1965 the Caldwells interviewed a number of professional sport-fishing-boat captains operating in the northeastern Gulf of Mexico in the region from shore to some 50 miles offshore between Pensacola and Panama City, Florida. During the course of the conversations, there were persistent reports of a "large black porpoise" which the captains called "blackfish." The captains reported that the "blackfish" were most often seen singly or in pairs, but that sometimes they were seen in herds of up to an estimated 100 animals and were said to occur in waters of 30 fathoms or greater, which in this region would mean some 20 miles or more offshore. The "blackfish" were said to be about twice the size of the common offshore spotted dolphin of the region, *Stenella plagiodon*, or thus an average length of some 15 feet. It was said to have a "snout," a full set of obvious teeth in both jaws, a dorsal fin more curved than that of the spotted dolphin, and to be overall black in color. A universal behavioral comment was that the "blackfish" is a notorious fish-stealer and that on many occasions large game fish of different kinds had

been stolen from fishermen's lines before they could be landed. On one occasion, such a fish was dropped by the "blackfish," and on being gaffed from the fishing boat proved to be a large snapper (*Lutjanus*) weighing some 16 or 17 pounds. Because of this habit of fish stealing, the "blackfish" have been observed in more detail by the fishermen than most cetaceans that they observe and hence the greater amount of lay information available concerning the animal. Animals with similar appearance, behavior and ecological distribution have also been informally reported to us by fishermen working off the general region of St. Petersburg, Florida, in the eastern Gulf of Mexico.

In trying to identify these animals, the most obvious suggestion would be to call them the pilot whale (*Globicephala*), which seems to fit the description in size and color and in the Gulf of Mexico as elsewhere is often termed "blackfish." However, several of the captains interviewed were familiar with *Globicephala* at sea and in captivity and stated that their "blackfish" was definitely not the same because it possessed a noticeable "snout" and lacked the large bulbous forehead of *Globicephala.* The full set of teeth reported for the unidentified "blackfish" eliminates any of the beaked whales of the genera *Ziphius* and *Mesoplodon* which might be of about the right size and color. The genera *Kogia* and *Grampus* can be eliminated on general morphology and tooth description and somewhat on the basis of size. Such delphinid genera as *Orcinus, Tursiops, Stenella, Steno, Phocoena* and *Delphinus* that are known from the Western Atlantic can be eliminated for various reasons of size, color or familiarity by the boat captains. The same may be said for the large toothed whale, *Physeter.* By elimination, no other likely cetacean seems to remain to fit the description of the "blackfish" except the false killer whale, *Pseudorca.* Furthermore, and on the more positive scale, this species is known previously from the Gulf of Mexico (Bullis and Moore, 1956; and Fig. 11 herein), it is the proper size and color, has a full set of very obvious teeth, has a noticeably-curved dorsal fin (Fig. 1), could be said (especially by a layman) to possess a noticeable "snout" (though not a beak), lives offshore (which is typical of *Pseudorca,* according to Bullis and Moore, 1956: 5) and is known to feed at times on large fish (see Scheffer and Slipp, 1948: 289; Bullis and Moore, 1956: 3; Daugherty, 1965: 38; the feeding notes given above as related to the capture of our California specimen; Appendix VII herein). Finally, behavioral notes supplied by Donnelley (1937), and repeated by Moore (1953: 141), for an animal observed off southeastern Florida, are surprisingly similar in context to the reports of fish-stealing given the Caldwells for the Gulf of Mexico "blackfish." In this instance, a lone cetacean, with some certainty identified from photographs as *Pseudorca* (an identification with which we concur after seeing the photographs), took a 2½-foot bonita (probably *Sarda*) bait dragged before it with such force and tenacity that the attached line soon broke.

The captains interviewed by the Caldwells reported that despite their willingness to steal fish, the "blackfish" still are often very wary and will not come too close to the boats. This wariness probably is learned behavior due

Figure 11. Adult female false killer whale from the central Gulf of Mexico. See Bullis and Moore (1956) for details concerning this specimen. U.S. Bureau of Commercial Fisheries photograph courtesy of Harvey R. Bullis, Jr.

at least in part to the frequent gunfire that is directed toward these animals because of their larcenous practices. One captain noted that once when a "blackfish" was wounded in such a manner, a second "blackfish" with it immediately departed the scene. We suspect that the injured animal in this

case was a male, and that the animal with it was a female. Such a lack of aiding behavior exhibited toward a distressed adult male, even though a comrade, seems almost typical of cetacean behavior under such circumstances (Caldwell and Caldwell, 1966), and contrasted with the positive interest shown toward the animal, a female, by its schoolmates during the initial phase of her capture, as described above, off California. We suspect that the wounded *Pseudorca* reportedly abandoned by its schoolmates during capture off Los Angeles (Norris and Prescott, 1961: 335) likewise was a male.

ACKNOWLEDGMENTS

Several members of Marineland's staff contributed their observations, both under captive and wild conditions, to this report. We would like to thank Captain Frank Brocato and his assistant, Frank Calandrino, for their continued help and accurate observations made at sea. We also wish to thank J. Courtland Beazie, Bruce Parks, Richard Blacker and Lawrence Clark for observations reported here. The interest and advice of Drs. M. E. Webber, Richard Hubbard and James C. Roberts, Jr., and Mr. Fred Newman, are also much appreciated. Particular thanks are also due Drs. Rankin W. McIntyre and John Simpson of the Los Angeles County Livestock Department for their skillful postmortem examinations of the pilot whale and common dolphin, and for their continued interest in the health problems of marine mammals. Mr. Jack Evans, owner of Tweedheads Aquarium, Coolangatta, Queensland, Australia, kindly allowed us to use some of his data on erysipelas infection in Australian *Tursiops* and on strandings of *Pseudorca* on those shores. We would also like to thank Mrs. Eleanor Zetterberg for her help in the preparation of an early draft of the manuscript, and Mary V. Butler of the Los Angeles County Museum of Natural History for help with preparation of one of the illustrations.

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APPENDIX I

Blood specimens are obtained from all newly-collected specimens of Cetacea at Marineland of the Pacific. Certain of the Marineland trained dolphins are also routinely subjected to serologic examination.

The animal involved in such an examination is exposed to a minimum of stress. Capillary bleeding is induced by a small surface incision in the trailing edge of the dorsal fin or tail flukes. Glass microtubes coated with ammonium heparate are used to collect blood samples. These microtubes are 150 mm. in length and hold the volume necessary for a complete blood count. Serologic examination has proved to be a useful device in both the diagnosis of disease and its prevention. The following are the complete blood counts for the false killer whale as taken on October 14, 1963, and on August 31, 1965:

	1963	*1965*
Red blood count	4,500,000	5,200,000
White blood count	6,600	5,600
Hemoglobin	13.9 gm. or 90%	15.7 gm. or 101%
Hemacrit	45%	52%
Differential:		
Segs	55	48
Stabs	2	0
Small lymphocytes	37	48
Monocytes	2	1
Eosinophils	4	3
Basophils	0	0

APPENDIX II

The large male pilot whale was captured and introduced into the Circular Tank on January 1, 1959 (Brown, 1962), where, after 10 months he was

conditioned to perform in the trained whale display. Prior to the incident described in the present paper, this male pilot whale had demonstrated unusual behavior. Two such cases, in 1960 and 1962, have already been reported elsewhere (Brown, 1962: 62f.; Caldwell, Brown and Caldwell, 1963).

This same animal again commenced to behave in a psychotic manner in July, 1962, and aggressive asocial activity vied with sporadic anorexia and depression. The female pilot whales captive with him became increasingly subject to apparently unprovoked attack despite long periods before when they had lived in apparent perfect harmony. As the weeks passed these attacks occurred with increasing frequency, particularly in the late afternoon and evening hours.

A major change became evident in the male pilot whale following the oral administration of Sparine (promazine hydrochloride). In the evening of August 16, 1962, after 7 days of therapy and improved behavior, he viciously attacked and killed his smallest female companion. The 780-pound female was thrown clear of the water surface by the violence of the assault. Pathologic examination of this animal revealed a fractured right ramus of the mandible and extensive bruising in the left ventral thoracic area. The pleural cavity contained approximately 14 liters of blood and an irregular tear some 30 mm. in length was found in the right ventricle of the heart.

On the evening of August 17, 1962, in an attempt to prevent further fatalities, the pilot whales were stranded on the floor of their tank. It was felt that a common stress conjointly shared might re-establish the strong social relationship normally so evident in this gregarious species. Throughout the stranding, the three animals lay closely together, and vocalized continuously. After 40 minutes the tank was refilled and to this writing further aggressive behavior has not been directed by the male pilot whale towards his companions and no further direct medication has been required to tranquilize him.

In the summer of 1963, this large male once more became partially inappetent. On August 27 he refused nourishment for 7 days and ate only intermittently during the weeks that followed.

No evidence of infection or disease could be detected, and his fasting continued despite the administration of appetite-stimulating drugs. Inanition became pronounced and by the end of September the animal apparently had lost at least 500 pounds of body weight.

On October 10, 1963, the pilot whale exhibited a dramatic response after Niamid (nialamide), a psycho-therapeutic (anti-depressant) drug, had been administered by intubation. He became appetent once more and continued this improvement during and at the conclusion of three months of Niamid therapy.

It is not inconceivable that the aberrant activity following the dolphin birth was allied to the abnormal behavior previously exhibited.

This animal now behaves in an ordinary manner. The whale is fed to repletion each day and, since his illness, has been excluded from further participation in the feeding shows.

It is felt the psychotic behavior demonstrated by this large whale was closely associated with environmental stress and normal activity repression. Since his retirement from active participation in the trained routines, the animal again indulges in play and reproductive activity, which drives were not expressed after his integration into the trained whale show.

APPENDIX III

Infection with *Erysipelothrix rhusiopathiae* was first incriminated in the loss of several captive dolphins, *Tursiops truncatus* and *Stenella plagiodon,* at Marine Studios in Florida (Siebold and Neal, 1956). Erysipelas has since been incriminated in the deaths of delphinids held in other oceanaria in the United States. In adition, in Australia, Jack Evans reported (*pers. comm.* to Brown) that two deaths suspected to be the result of erysipelas septicemia had occurred in *Tursiops* that he had supplied to the Taronga Park Zoological Gardens, Sydney. Mr. Evans reported further that the same pathogens had been recovered in Australia as in the United States.

Deaths have occurred from the chronic and acute forms of infection. The onset of symptoms in the chronic form of this disease is heralded by elevated body temperature, partial or complete inappetence and the eruption of cutaneous lesions which generally are elevated and sharply outlined. These can develop on any part of the infected animal.

Cases of chronic infection, if promptly treated, can be controlled readily by the administration of penicillin. *E. rhusiopathiae* is a gram negative organism and is normally extremely sensitive to this antibiotic. If the animal is treated in time, the skin of the affected area and the adipose tissue beneath sloughs and the denuded area is gradually invaded by healthy tissue.

The acute form is difficult both to diagnose and treat. The onset of symptoms is rapid, and these usually consist of inappetence, high fever and recumbent behavior. The disease generally terminates fatally soon after these symptoms become apparent.

Two pilot whales succumbed from acute erysipelas shortly after their arrival at Marineland of the Pacific. In both cases *E. rhusiopathiae* was isolated from the spleen and liver. Confirmation of this diagnosis was obtained by passing an inoculum of the isolate into mice, with pathology resulting.

Following these losses, which occurred in 1964, all of Marineland's delphinids have been inoculated with erysipelas bacterin. This bacterin is prepared for the immunization of swine and turkeys by subcutaneous administration. The bacterin is administered to delphinids by injection into the muscle of the caudal peduncle. No anaphylactoid reactions have resulted from this treatment to date, and other effects have been limited to a transitory stiffness in the area of injection.

Since embarking on this program of preventive medicine, no further losses from acute erysipelas septicemia have occurred. Several mild cases of the chronic form have responded rapidly to the oral administration of penicillin.

APPENDIX IV

After removal from the Circular Tank, the female common dolphin was placed into a holding pool and treated for gastric impaction. Her condition, however, continued to regress and on April 15, 1965, the animal was found dead on the floor of her pool.

Pathologic investigation showed intussusception to be the cause of death. This condition was found in the small intestine 12 inches below the pylorus. In this area the submucosae showed varying degrees of necrosis, edema and congestion.

Intussusception, or the evagination or telescoping of the intestine, is commonly caused by irregular or excessive peristaltic movements. Enteritis, intestinal parasites and major dietary changes are frequently incriminated in the excitation of this condition. No parasites or gastroenteric pathogens were recovered from this animal. However, the variety of fish on which she had subsisted for many months became unavailable and a change of food became necessary shortly before the initial symptoms of illness were recorded.

APPENDIX V

Caldwell, Caldwell and Siebenaler (1965: 4) described the phenomenon of observational learning in captive bottlenose dolphins, *Tursiops truncatus.* More recently, at Marineland of the Pacific, a female *T. truncatus,* some 6 feet in length and originally captured some months before at New Smyrna Beach, Florida, learned to spin by observing the natural behavior of a 65-inch female spinning dolphin, *Stenella* cf. *roseiventris* (Wagner), from Hawaii. The spinning by the *Tursiops* was observed only minutes after she was placed for the first time in a show tank with the *Stenella.* The *Tursiops'* spinning leap (Fig. 12) was made almost immediately after the *Stenella* had made her spin upon a previously-reinforced cue. Although a different species of *Stenella* apparently was involved, the spinning behavior was described and illustrated by Hester, Hunter and Whitney (1963). The Marineland *Stenella* did not leap as high as the illustrated dolphin, but the horizontal form of the leap and spin on the long axis of the body was essentially the same.

At this writing an attempt is being made to reinforce the spin by the *Tursiops* so that the animal can be integrated into the dolphin show. However, before such reinforcement was begun she was clearly learning to make the spinning motion without human instruction. Although not polished, the spin out of water consisted of almost 1½ complete revolutions, or about he action illustrated by the first 9 to 11 frames beginning on the right in the figure cited above. We have neither seen ourselves nor heard reports of a spinning leap by an Atlantic *Tursiops* made under wild or unconditioned captive conditions.

Newly captive Pacific striped dolphins (*Lagenorhynchus obliquidens*) will learn to leap in an arc as high as 15 feet from the surface of the water, copying the leaps of specimens of this species already established in the Marineland display. Such high leaping is reinforced at Marineland, but leaping in a similar

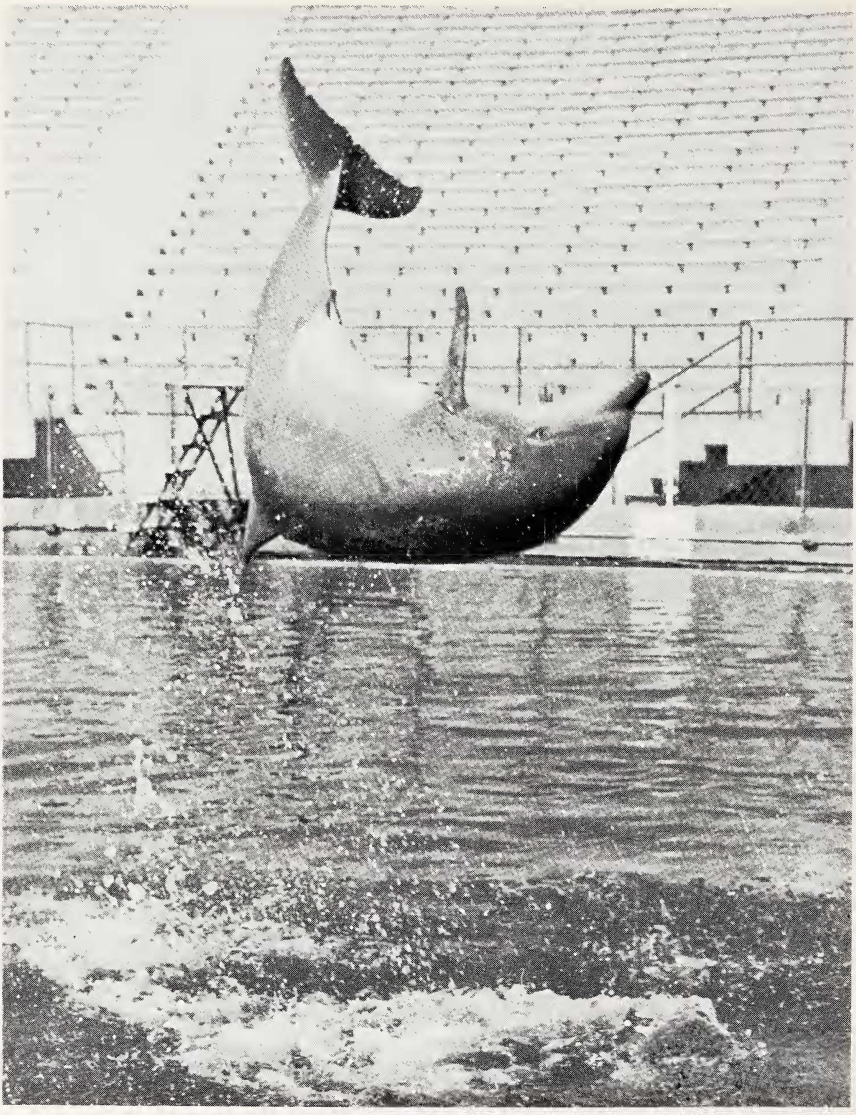

Figure 12. Captive female Atlantic bottlenose dolphin during her spinning leap described in text. Photograph by Cliff Brown, Marineland of the Pacific.

manner is natural to this species and these active dolphins can in fact frequently be observed behaving in this manner at sea. However, the high leaps in unison and on cue at Marineland seem at least in large part to be a result of observational learning by new animals from old residents.

Learning by observation may have been demonstrated by a captive male *T. truncatus* at Marineland of the Pacific in which he observed adult females of this species break up their food before eating it and then apparently attempted to do this for himself (see Norris and Prescott, 1961: 312).

APPENDIX VI

Mr. Jack Evans has provided a stranding record, supported by photographs (Fig. 13), that clearly is the false killer whale. Although an exact date is not available, Mr. Evans reported that several of these animals stranded "several years ago" on a beach in northern New South Wales approximately 300 miles south of Coolangatta, Queensland, Australia. One of the photographs that he provided shows heavy wear on the tips of all of the teeth of the left mandibular row of one of the whales. The wear shown is reminiscent of that illustrated by Caldwell and Brown (1964: 133) for the ferocious killer whale, *Orcinus orca* (Linnaeus), although it is less extreme in the case of the illustrated *Pseudorca*. Such apical wear in a false killer whale may only be of the same sort often found in older individuals of other delphinids, ones that generally only swallow their food entire, and not the rather complicated tooth wear found in *Orcinus*. However, its presence, coupled with the known feeding habits of *Pseudorca* as described herein (Appendix VII), should be noted as an invitation for careful study of the wear on teeth of this latter species.

Ten mass strandings of small whales on Australian shores during the past 17 years were listed (five with photographs) in a recent popular newspaper article (McKenna, 1965). Two of these strandings were, with little doubt, of *Pseudorca*. Where data were given, including information taken from the photographs, at least four animals stranded together in each case, and as many as about 80 (another news release on this stranding gave a figure of 100). Many lay opinions, mostly untenable, were proposed to explain the strandings. However, it is perhaps significant to note that McKenna reported that all of the strandings occurred on gradually sloping beaches, on broad shallow flats or in shallow bays and estuaries.

Of the ten reports, we believe that the stranding of some 80 (100) animals on a beach fully exposed to the sea, near the tip of Flinders Island, in Bass Strait, sometime in the first half of 1965, consisted of *Pseudorca*. The animals, in low-level photographic aerial view, were dark in color, had appropriate body proportions, in several instances had the typical form of the pectoral flipper that is long and sickle-shaped (see Figs. 2, 5, 6 and 11 herein), and ranged, according to McKenna, from 10 to 20 feet in length (the latter figure is probably somewhat excessive).

A stranding of at least 25 animals (the photograph was cropped in such a way as to suggest that there were many more) near Burnie, Tasmania, in 1948, also appeared to be of *Pseudorca* although our determination in this case was made with somewhat less confidence than the previous one. The animals were dark in color, had the strongly-hooked dorsal fin typical of *Pseudorca* (see Fig.

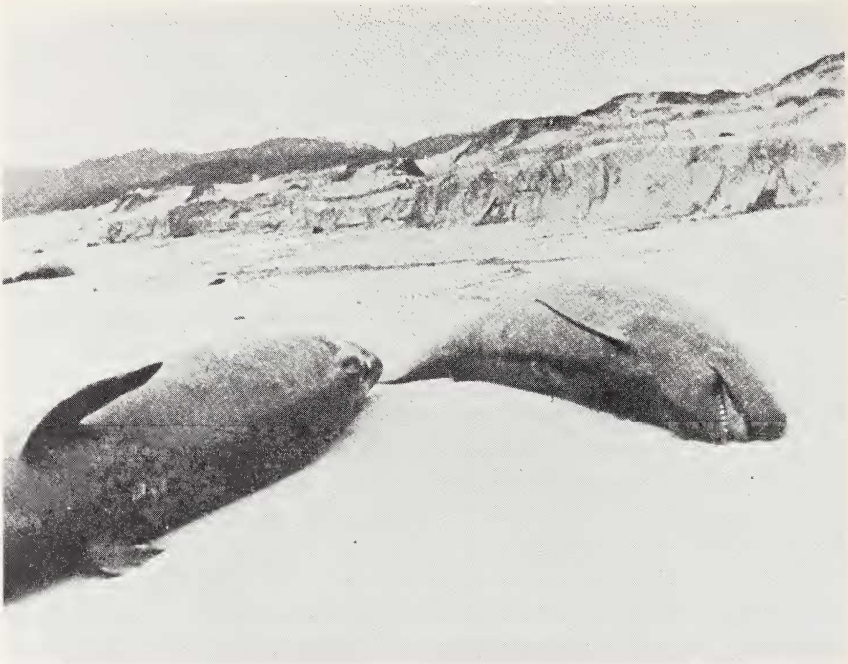

Figure 13. Upper and lower: stranded false killer whales on beach in northern New South Wales approximately 300 miles south of Coolangatta, Queensland, Australia. Note worn tips of mandibular teeth below swollen tongue in lower animal, apparently a male. Photographs courtesy of Jack Evans, Tweedheads Aquarium, Coolangatta.

1 herein), and, as judged from human figures associated with the animals, were of an appropriate size. The pectoral flipper of one whale appeared to have the typical *Pseudorca* sickle-shape, but this same animal seemed to have a much more prominent chevron of light pigment on the ventral side between and anterior to the insertions of the pectoral flippers than the rather faint light chevron of the Marineland captive. However, this difference could have been a photographic artifact due to glare on the wet animal.

The McKenna photographs of strandings in 1956 in northern New South Wales (at least 40 animals); at Bremer Bay, Western Australia, in 1960 (at least 4 individuals); and at Ninety Mile Beach, Victoria, in 1961 (at least 27 animals), all could be of *Pseudorca*. The animals were dark in color and apparently of an appropriate body configuration. However, there were no suitable scale guides with which to estimate their size, and characters typical of *Pseudorca* were not obvious as had been the case in the two other strandings just discussed.

According to McKenna, 32 "black" whales were reportedly seen "jostling one another" to leave the water to strand at Wreck Bay, near Nowra, New South Wales, in 1963.

Four other strandings reported by McKenna are even less certain with regards to specific identification: 13 whales swam ashore at Newcastle, New South Wales, in 1962, and three mass strandings of whales "in big numbers" took place in a recent but unstated 5-year period at Doubtful Island near Albany, southwest Western Australia.

Only two of the ten Australian strandings listed by McKenna had enough data associated with them to make a relatively positive determination of the kind of animal involved. However, we include all of them here not only because the data with them suggest that some or all could have been *Pseudorca,* but also because we believe that it is important to note the relatively frequent reports of such mass cetacean strandings along the shores of the southern half of Australia.

APPENDIX VII

In April, 1964, Mr. Georges Gilbert told Brown of an interesting observation on cooperative feeding behavior which had involved *Pseudorca* in the wild at sea off the Kona coast of Hawaii, late in 1963.

Gilbert stated that he watched a large female false killer whale as she captured a very large mahimahi, or dolphin-fish (*Coryphaena*), and then stop and hold it in her mouth in order to allow her accompanying young to feed on it by tearing large chunks of flesh from the fish.

On another occasion in Hawaii, Brown witnessed an autopsy of a large male *Pseudorca* shortly after it was captured. The stomach of this animal contained the remains of a large *Coryphaena.*

In October, 1965, Mr. Chris Varez told us of his experiences with *Pseudorca* feeding behavior, also in Hawaii. He noted that in late 1963 or early 1964 he had often encountered this species in schools of some 10 to 50 animals

off the Kona coast. On one such occasion in particular he had been impressed by the dramatic capture of a large 18- to 20-pound *Coryphaena* by a false killer whale. The whale captured the *Coryphaena* and then extended the upper part of its body out of the water with the large fish draped between its jaws, blood from the fish streaming down the black sides of the whale. Varez then observed the *Pseudorca* bite off and consume small pieces of the fish.

These observations, along with those cited in the main body of the text above, clearly indicate that *Pseudorca* is a frequent predator on large pelagic fishes.

Varez also noted that a captive male *Pseudorca* he had worked with at Sea Life Park in Hawaii tended to break up the large fish it was fed before actually eating them, as the wild one had done, although the captive seemed to prefer having the large fish initially in order to follow this feeding pattern. Varez stated that the false killer whale would accept a whole large fish, such as a *Coryphaena,* and then shake it vigorously until the head broke off and most of the entrails spilled out and also broke away. Then the whale would eat the flesh in smaller pieces, but usually would leave the skin uneaten. It would also leave uneaten the skin of large filets of marlin and other large fishes given it, eating only the flesh. Apparently this behavior became an esthetic problem to the establishment because the unsightly skin that remained would be allowed by the whale to drift to the bottom of the tank. We know of no other observations on delphinids so deliberately breaking up their food with the exception of two rather old female *Tursiops truncatus* which often did so at Marineland of the Pacific (also see Norris and Prescott, 1961: 312).

Despite the behavior of this false killer whale after receiving its food, Varez was impressed with how gentle the whale was when it took the food from Varez' hand. This behavior is like that of our animal at Marineland, and, also like ours, the Hawiian captive *Pseudorca* would eat dead squid and small fish. However, the Hawaiian anmal later refused the squid and seemed to prefer fish (the larger the fish, the better it seemed to be to his liking).

Finally, Varez noted that the Hawaiian *Pseudorca* often carried a food fish for as long as 3 or 4 hours before eating it, although he obviously intended to do so. The Marineland false killer whale has also been observed to save the last fish offered it at the end of a whale show and to carry it for a long time, chewing on it and often dropping it near a dolphin tank-mate before grabbing it back as if to tease the other animal.